U.S. Department of Transportation
United States Coast Guard

Commandant
United States Coast Guard

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COMDTINST 16500.23
OCT 30 1996

COMMANDANT INSTRUCTION 16500.23

Subj: RANGE DESIGN CONSIDERATIONS

Ref: (a) Aids to Navigation Manual - Administration (COMDTINST M16500.7)
(b) Range Design Manual (COMDTINST M16500.4A)
(c) Automation Technical Guidelines (COMDTINST M16500.8A)

1. PURPOSE. This instruction provides area and district aids to navigation personnel with criteria for establishing day/night ranges and the use of range dayboards.

2. ACTION. Area and district commanders and commanders of maintenance and logistics commands shall ensure compliance with the provisions of this instruction.

3. DIRECTIVES AFFECTED. The contents of this instruction will be incorporated into future changes to references (a), (b) and (c).

4. DISCUSSION.

   a. Traditionally the lights on ranges, particularly those powered by batteries, were secured during daylight. The daytime signal was provided by dayboards. Recent significant efficiency improvements in optics combined with solar power has allowed us to expand the use of daytime ranges even when commercial power is not readily available.

   b. Dayboards are simple. Having no moving parts they require little maintenance and are more reliable than lights. The smaller boards are easy to maintain. No special training is required.

c. Daytime lights provide a superior signal. In marginal conditions they can be seen further than dayboards. Substituting lights for large dayboards may result in less costly tower structures and foundations. There will, however, be more complex lighting and power systems which will increase the technical demands on our aids to navigation team personnel. There will also be higher initial equipment cost.

d. Enclosure (1) contains a decision guide and range category descriptions to assist in determining the type of range to provide.

5. PROCEDURES. Area and district personnel shall consider the following when a WAMS analysis establishes the need to construct a new range or replace an existing range:

a. Dayboards are not necessary when daytime lights are provided.

b. Distances less than 2 nautical miles, as measured from the rear structure to the far end of the channel, are best marked by dayboards. The nighttime signal can usually be provided with standard omnidirectional lanterns and associated equipment. In this situation, daytime range lights should only be considered in areas prone to poor meteorological visibilities.

c. Distances greater than 4 nautical miles are best marked by daytime range lights provided there is an operational need to mark the entire channel.

(1) The existence of a long channel does not in itself justify the need to mark the entire channel with a range. New bridge technologies such as DGPS/ECS should be considered in determining the operational requirements.

(2) Daytime light systems may not be available to meet the operational requirement for very long reaches. However, available systems will still exceed range dayboard capabilities.

(3) A range light controller may be required on long reaches because of the significant differences in intensities required to provide both day and night signals. Should the lights on both structures fail to switch in a short time the range would effectively be unusable since the daytime light would overpower the nighttime light. Enclosure (1) contains the criteria for using range light controllers.

d. Distances between 2 and 4 nautical miles should be be marked as operationally required of as economically as possible. It may be that a lighted daytime range is not required but the system lifecycle cost of a lighted range might be lower than using dayboards.

e. Projects to establish daytime ranges shall be forwarded to Commandant (G-OPN-2) for operational approval. Commandant (G-SEC-2) will provide input for range design and equipment selection.

/s/
M. F. McCORMACK
Acting Chief, Operations Policy
Directorate

Encl: (1) Range Category Selection Aid

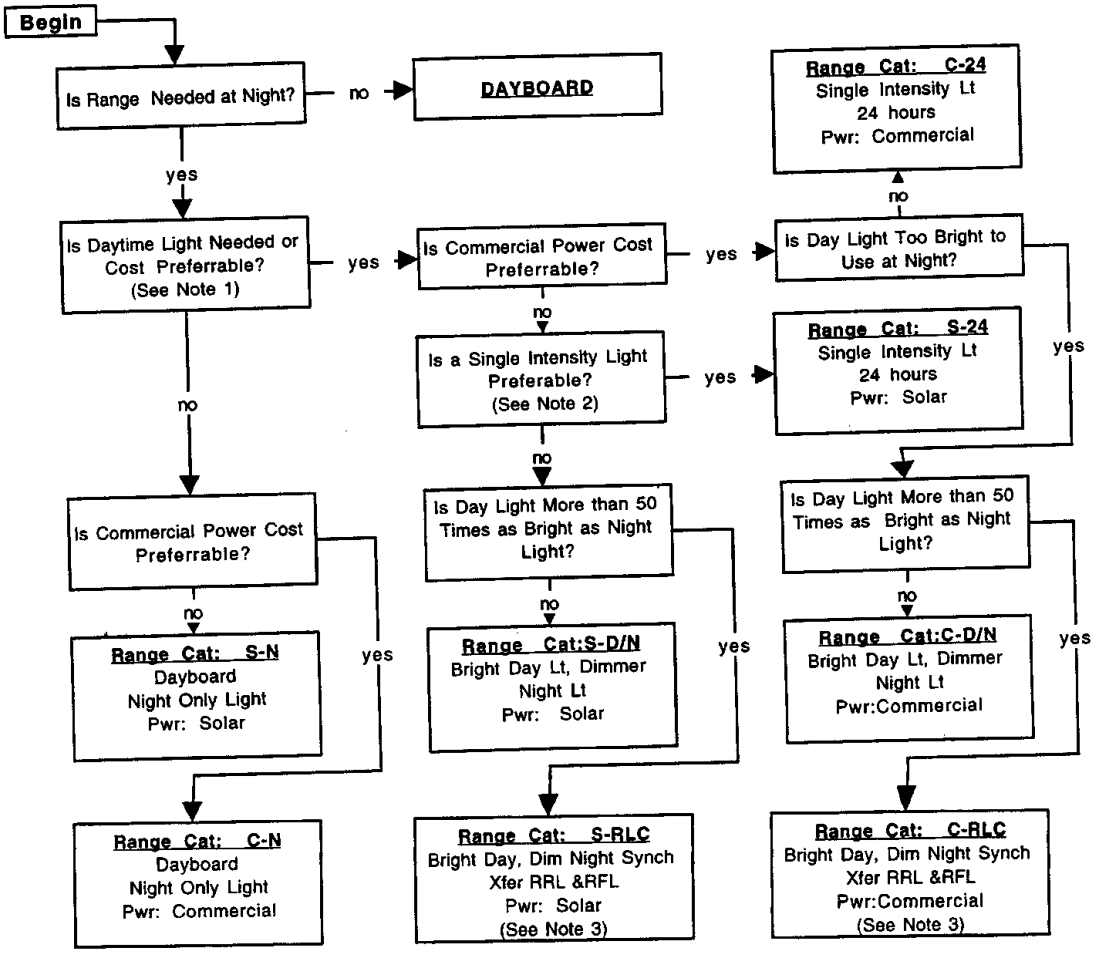
RANGE CATEGORY SELECTION AID

Commercial Powered Range Category

C - N	Com'l Night (only) Lt
C - 24	Com'l 24 Hour Light
C - D/N	Com'l Day & Night Lts
C - RLC	Com'l Day & Night Lts (Synch RRL & RFL Transfer)

Solar Powered Range Category

S - N	Solar Night (only) Lt
S - 24	Solar 24 Hour Light
S - D/N	Solar Day & Night Lts
S - RLC	Solar Day & Night Lts (Synch RRL & RFL Transfer)



USCG RANGE EQUIPMENT CATEGORY CONFIGURATIONS

Commercial Powered Range Category		**Solar Powered Range Category**	
C - N	Comm'l Night (only) Lt	**S - N**	Solar Night (only) Lt
C - 24	Comm'l 24 Hour Light	**S - 24**	Solar 24 Hour Light
C - D/N	Comm'l Day & Night Lts	**S - D/N**	Solar Day & Night Lts
C - RLC	Comm'l Day & Night Lts (Synch RRL & RFL Transfer)	**S - RLC**	Solar Day & Night Lts (Synch RRL & RFL Transfer)

Notes to Accompany Category Selection Aid Flow Diagram

1. See COMDTINST 16500.23, Range Design Considerations, for factors to consider when deciding whether or not to use daytime lights. Using newly distributed Excel Range Design Program, design the range using dayboards, then redesign the range using daytime lights. Compare performance characteristics and associated costs of each approach to make a final judgement.

2. Like most aspects of range design, choosing between a single intensity, 24-hour signal or a dual intensity, day/night signal for solar applications involves trade-offs:

a. Factors that favor a single intensity light include:
Fewer Optics (to buy and service)
No need for day/night control switching
Brighter night light usually a superior signal
Simpler system

b. Factors that favor a bright day light and a dimmer night light:
Requires fewer solar panels than brighter 24-hour light
Requires less battery capacity than brighter 24-hour light
Dimmer night light will tend to lower required height of Rear Range Light

3. The Range Light Controller (RLC) is an EECEN-developed, microprocessor-based device to synchronize switching of front and rear lights from day to night signals simultaneously; its use is recommended when day and night light intensities differ by so much that the range is **not usable** in the short period when both front and rear lights are not in the same day or night mode.